

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appl. No. : 10/816,110  
Applicant : Huwei Tan  
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Customer No. : 06449  
Confirmation No. : 8501

**DECLARATION UNDER 37 C.F.R. §1.132 OF HUWEI TAN**

Commissioner of Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450

Dear Sir:

I, Huwei Tan, declare as follows:

1. I am the sole inventor of the subject matter described and claimed in United States Patent Application Serial No. 10/816,110, filed on April 1, 2004, entitled "Method And System For Dual Domain Discrimination Of Vulnerable Plaque".

2. I am a co-author of an article entitled "Multivariate Calibration of Spectral Data Using Dual-Domain Regression Analysis," *Analytica Chimica Acta*, vol. 490, pages 291-301, published May 8, 2003 (hereinafter "the Multivariate Calibration article" or "the article").

3. I am the sole inventor of the subject matter disclosed in the Multivariate Calibration article and disclosed and claimed in the present application.

4. Although Steven D. Brown is a co-author of the Multivariate Calibration article, he did not contribute to conception or development of the subject matter disclosed in the article and disclosed and claimed in the present application.

5. Steven D. Brown was my mentor during my post-doctoral work at the University of Delaware when I developed the subject matter of the Multivariate Calibration article.

6. Dr. Brown's only contributions to the Multivariate Calibration article were editorial; he reviewed and helped edit drafts of the article.

7. Dr. Brown was listed as a co-author of the publication only because of his position as my mentor and because of his editorial contributions.

8. The undersigned further declares that all statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

by

Huwei Tan

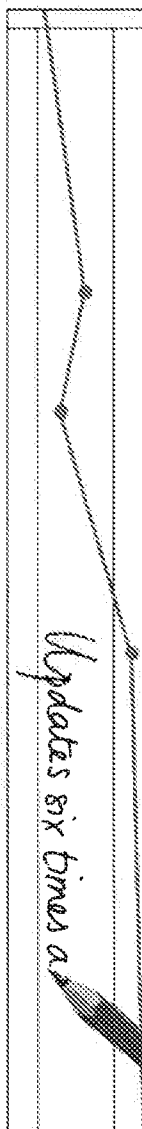
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## Multivariate calibration of spectral data using dual-domain regression analysis

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### Abstract

To date, few efforts have been made to take simultaneous advantage of the local nature of spectral data in both the time and frequency domains in a single regression model. We describe here the use of a novel chemometrics algorithm using the wavelet transform. We call the algorithm dual-domain regression, as the regression step defines a weighted model in the time-domain based on the contributions of parallel, frequency-domain models made from wavelet coefficients reflecting different scales. In principle, any regression method can be used, and implementation of the algorithm using partial least squares regression and principal component regression are reported here. The performance of the models produced from the algorithm is generally superior to that of regular partial least squares (PLS) or principal component regression (PCR) models applied to data restricted to a single domain. Dual-domain PLS and PCR algorithms are applied to near infrared (NIR) spectral datasets of Cargill corn samples and sets of spectra collected on batch chemical reactions run in different reactors to illustrate the improved robustness of the modeling.

**Author Keywords:** Wavelet; Alternate domain regression; PLS; Calibration; Robust calibration

### Article Outline

1. Introduction
2. Theory

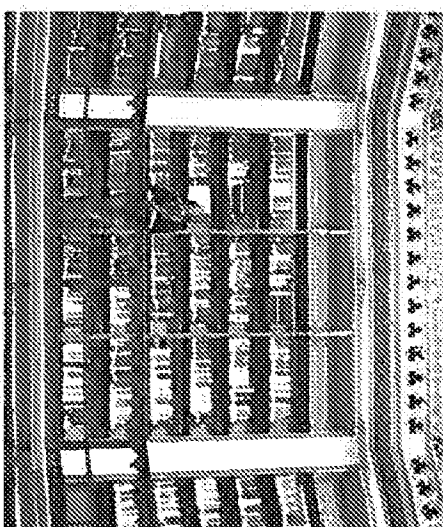
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